

# Cumulative Effects of Power Plants

A report by the  
State Advisory Board on Air Pollution

*Electric Utility Restructuring Act Task Force*

*November 26, 2001*

# State Advisory Board on Air Pollution

- An advisory committee appointed by the State Air Pollution Control Board
- 26 members representing air quality program stakeholders
- Prepares recommendations and reports to the SAPCB on 3-4 topics each year

CUMULATIVE EFFECTS  
SUBCOMMITTEE REPORT  
TO  
STATE AIR POLLUTION  
CONTROL BOARD

# PREPARED BY:

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# BACKGROUND

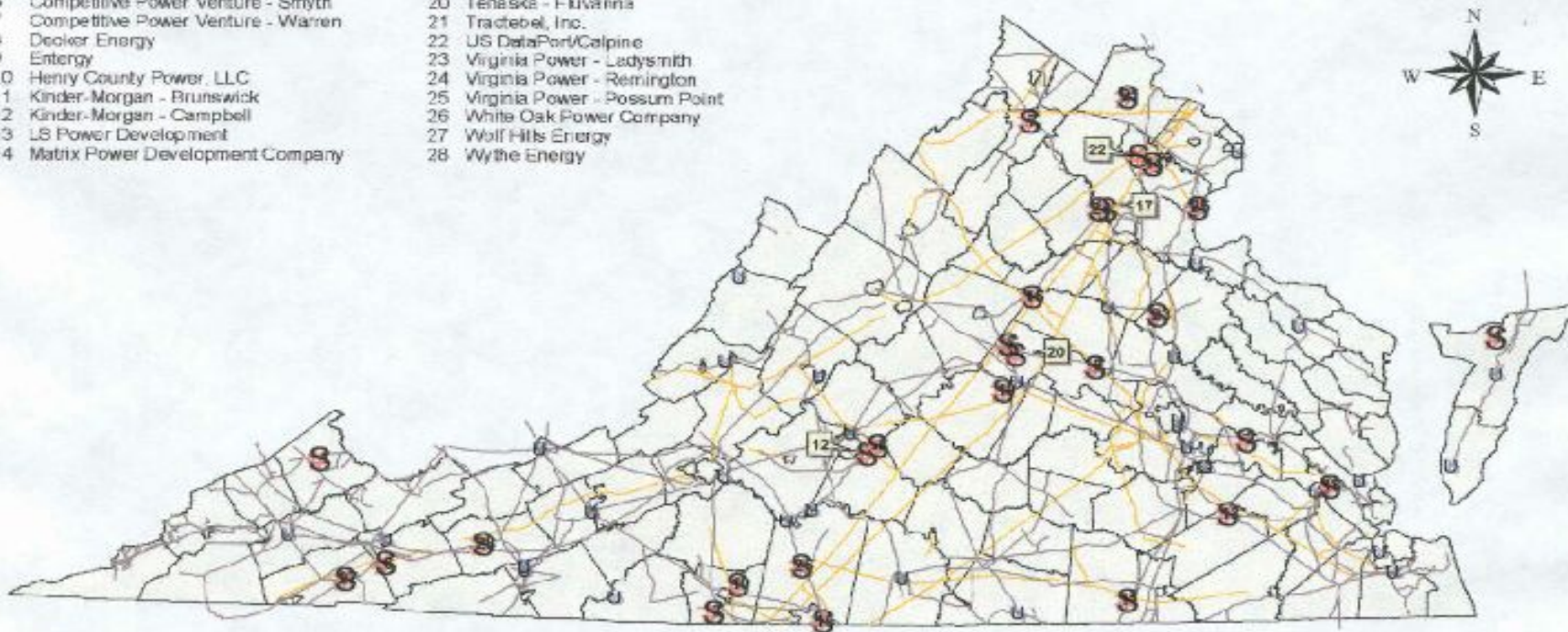
- Deregulation of electric generation – spurred proliferation of power plants
- Individual air quality modeling done for major individual plants/projects
- No cumulative impact air quality assessment required to be done for multiple synthetic minor sources per current regulations

# MISSION STATEMENT

- To make recommendations for evaluating cumulative impacts of ozone precursors, particularly Nox emissions, from new sources, in a way that helps evaluate technical, economic and environmental effects of Nox emissions and emissions controls so that the DEQ can form technical and regulatory review policy for Nox emissions sources.

# PROPOSED POWER GENERATION FACILITIES IN VIRGINIA

- |  |                                  |
|--|----------------------------------|
| 1 Allegheny Energy Supply              | 15 Mirant                        |
| 2 Chickahominy Power                   | 16 ODEC - Louisa                 |
| 3 Cincap                               | 17 ODEC - Remington Marsh        |
| 4 Commonwealth Chesapeake Corporation  | 18 Sandidg Energy                |
| 5 Competitive Power Venture - Fluvanna | 19 Tenaska - Buckingham          |
| 6 Competitive Power Venture - Smyth    | 20 Tenaska - Fluvanna            |
| 7 Competitive Power Venture - Warren   | 21 Tractebel, Inc.               |
| 8 Decker Energy                        | 22 US DataPort/Calpine           |
| 9 Entergy                              | 23 Virginia Power - Ladysmith    |
| 10 Henry County Power, LLC             | 24 Virginia Power - Remington    |
| 11 Kinder-Morgan - Brunswick           | 25 Virginia Power - Possum Point |
| 12 Kinder-Morgan - Campbell            | 26 White Oak Power Company       |
| 13 LS Power Development                | 27 Wolf Hills Energy             |
| 14 Matrix Power Development Company    | 28 Wythe Energy                  |



Prepared by: Virginia Economic Development Partnership  
Data Sources: VEDP, NPMS, USGS, SCC

S Proposed Power Plant  
U Existing Power Plant  
Power Transmission  
Natural Gas Transmiss

# CONCLUSIONS

- Development of new power plants provides valid reason to investigate impacts of ozone precursors, particularly Nox.
- DEQ has been conducting NSR per regulations
- DEQ has performed additional modeling beyond required for synthetic minor sources
- DEQ has evaluated cumulative impacts from modeling – shows “within the noise” impacts from addition of 8 new power plants
- Ability of current modeling technology to produce meaningful results – questioned by DEQ modelers



# CONCLUSIONS

- DEQ doesn't have staffing to support multi-source modeling for synthetic minor sources
- Cost to outsource multi-source modeling is \$500,000 – without setup costs
- Establishment of initial database of all emitters in state is difficult and manpower intensive (database will soon be obsolete with emissions reductions – Nox SIP Call)
- DEQ has performed statewide air quality monitoring for 10 years – no clear trends in ozone and Nox data
- Air quality data shows more areas would be struggling to meet new 8 hour ozone standard

# CONCLUSIONS

- Phase II acid rain reductions (Title IV), Nox SIP call and regional haze rules mandate severe emissions reductions for ozone precursors. Effects of reductions need to be accounted for in cumulative impact studies
- AQRV in Class I areas may still be compromised despite large reductions in Nox, SO<sub>2</sub> emissions
- Contributions of mobile sources in Nox emissions cumulative impacts is under represented
- Not scientifically justified to single out power generation sector only, need to include all source sectors

# CONCLUSIONS


- Other states are evaluating cumulative impacts
- Locating new power generation plants is based on available natural gas lines, electric transmission lines, cooling water source and stream capacity. It is not based on Greenfields vs Brownfields considerations.

# RECOMMENDATIONS to SAPCB

- Conduct periodic re-assessment of regional ozone impacts, but no more than twice/year, as resources permit
- Improve public perception and awareness of cumulative impacts by:
  - Highlighting DEQ efforts in multi-source modeling and the solutions
  - Providing projections for emissions of ozone precursors taking into account Nox SIP Call, regional haze rule, and Phase II acid rain rule

# RECOMMENDATIONS to SAPCB

- Participate in multi-state initiatives addressing cumulative impacts – including on-going MARAMA, CALPUFF efforts
- Ensure contributions of mobile sources are properly evaluated in cumulative impacts
- DEQ should continue to research and evaluate cumulative impacts issue with a clearly defined mission



# **State Advisory Board on Air Pollution**

## **Cumulative Effects Work Group**

### *Environment & Health Subgroup*

### *Findings & Recommendations*

#### **Subgroup Members**

**Christi Gordon, National Park Service, Shenandoah National Park**

**Dan Holmes, Piedmont Environmental Council**

**Donna Reynolds, American Lung Association of Virginia**

# Mission Statements

*A vested interest in natural resources, air quality, human health, and cultural and historic resources*

National Park Service: “...to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same...as will leave them unimpaired for future generations.”

Piedmont Environmental Council: “Promoting and protecting the Piedmont’s rural economy, natural resources, history and beauty.”

American Lung Association: “Preventing lung disease and promoting lung health”

Cumulative Effects Work Group: “To make recommendations for evaluating cumulative effects of multiple new and modified sources of air pollution in a way that helps evaluate technical, economic, environmental, and health effects.”

# Power Plants

- Deregulation→ Proliferation of applications → Elevated concerns about cumulative effects of new emissions growth.

- Mostly “major” sources

- Mostly natural gas with fuel oil backup

- Most siting in attainment areas

- Many siting near Class I, nonattainment, or maintenance areas

- Hotspots for permitting activity:

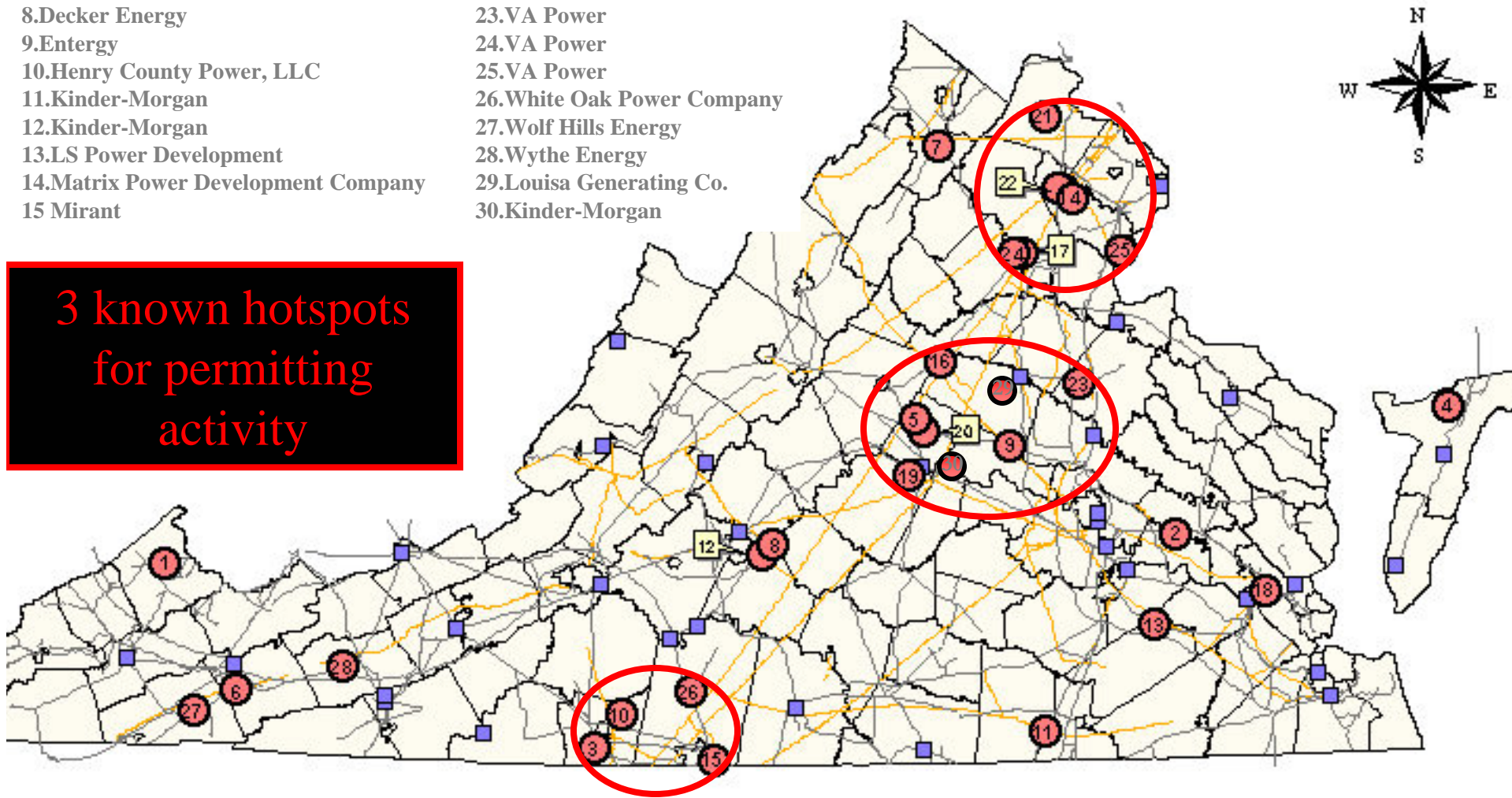
Central Piedmont, South central VA & No. VA



# Proposed Power Generation Facilities in Virginia

- |                                      |                             |
|--------------------------------------|-----------------------------|
| 1. Allegheny Energy Supply           | 16. ODEC                    |
| 2. Chickahominy Power                | 17. ODEC                    |
| 3. Cincap                            | 18. Standish Energy         |
| 4. Commonwealth Chesapeake Corp.     | 19. Tenaska                 |
| 5. Competitive Power Ventures        | 20. Tenaska                 |
| 6. Competitive Power Ventures        | 21. Tractebel               |
| 7. Competitive Power Ventures        | 22. US Dataport             |
| 8. Decker Energy                     | 23. VA Power                |
| 9. Entergy                           | 24. VA Power                |
| 10. Henry County Power, LLC          | 25. VA Power                |
| 11. Kinder-Morgan                    | 26. White Oak Power Company |
| 12. Kinder-Morgan                    | 27. Wolf Hills Energy       |
| 13. LS Power Development             | 28. Wythe Energy            |
| 14. Matrix Power Development Company | 29. Louisa Generating Co.   |
| 15. Mirant                           | 30. Kinder-Morgan           |

3 known hotspots  
for permitting  
activity



# Highlights of Conclusions

- Virginia must ensure balance

Environment/Health  Clean Energy/Industrial Growth

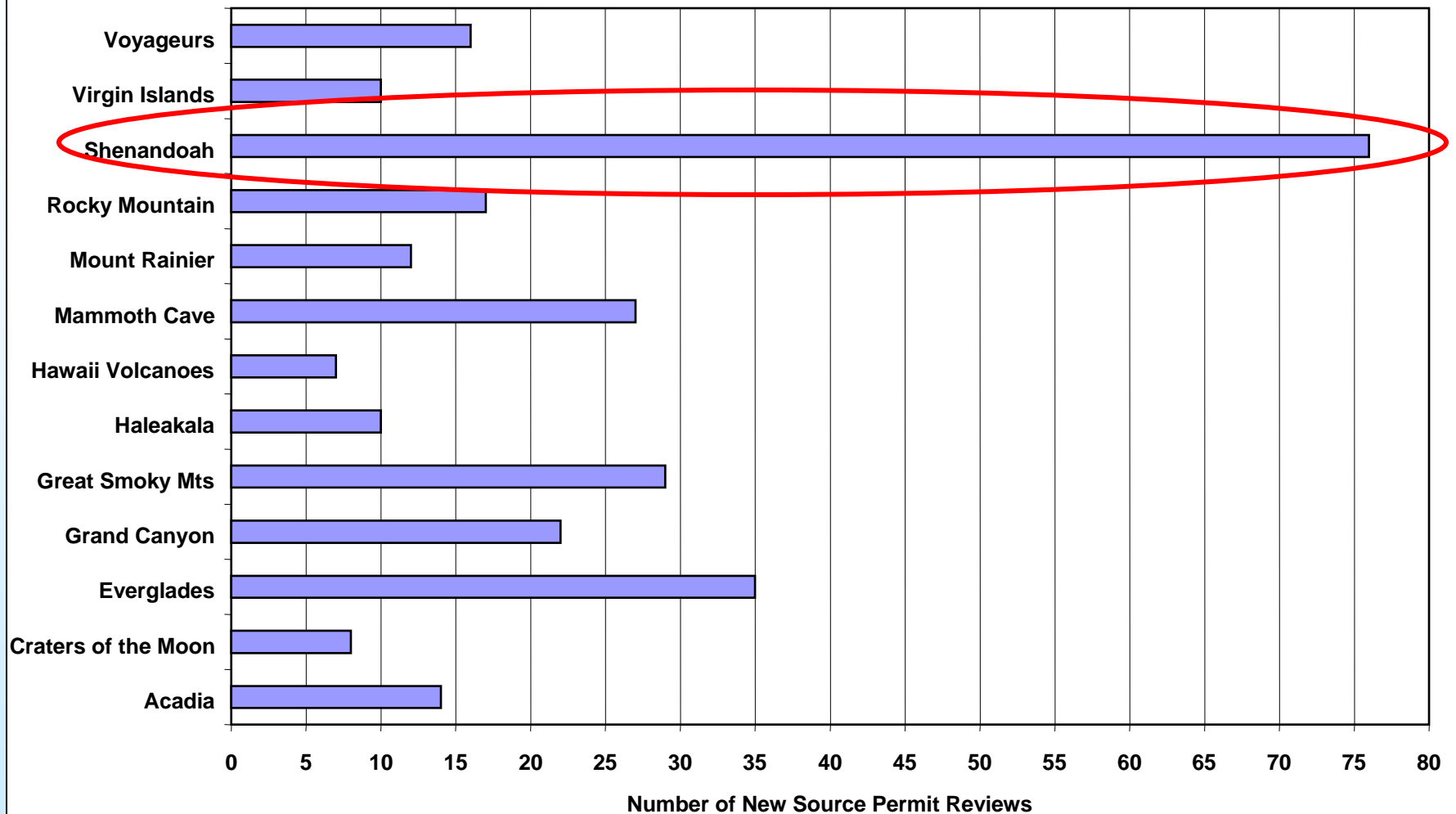
- Other States affecting Virginia's air quality also have upward surges in permitting activity
- Several States have slowed their energy development programs to allow time for cumulative effects analysis

Kentucky, Tennessee, Georgia and the Pacific Northwest

## Highlights of Conclusions (cont.)

- Scope, magnitude & rate of proliferation of applications for power plants in Virginia warrants a timely, broader “cumulative effects” modeling analysis to fully inform DEQ & SCC decisions
  - Unprecedented levels of new emissions growth
  - Nationally significant permitting program
  - Absence of comprehensive review of adequacy of PSD program (40 CFR 51.166)
  - Existing air quality impairment
  - Readily available modeling tools

### National Park Service New Source Permit Reviews by Park January 1987 - December 2000



- At least 15 additional permit notifications and or applications since Dec. 2000

# Recommendations to SAPCB

- Continue the cumulative Effects Work Group effort with our recommended CEWG mission
- Expand & Accelerate DEQ Modeling Activities
  - Regional ozone model & CALPUFF
  - “Worst case” cumulative effects analysis to protect health & environment
  - Meet health based O3 & PM 2.5 standards
  - Meet Virginia laws related to emissions trading & new source set-asides
  - Meet Class I & II PSD increments-NO<sub>2</sub>, SO<sub>2</sub>, PM 10
  - Avoid new, or worsening of existing, adverse environmental impacts (e.g. Class I & Class II including Piedmont & Chesapeake Bay)

## Recommendations to SAPCB

- Consider Additional DEQ and SCC staffing needs
  - DEQ meteorologists/modelers
  - DEQ emissions inventory coordinator
  - SCC hearing examiners/other
- Add air quality trends information to DEQ Annual Monitoring Data Report
- Form Separate Work Group to address mobile sources

# Install & Operate Additional O<sub>3</sub> & PM 2.5 Monitors

## Ozone Health Effects

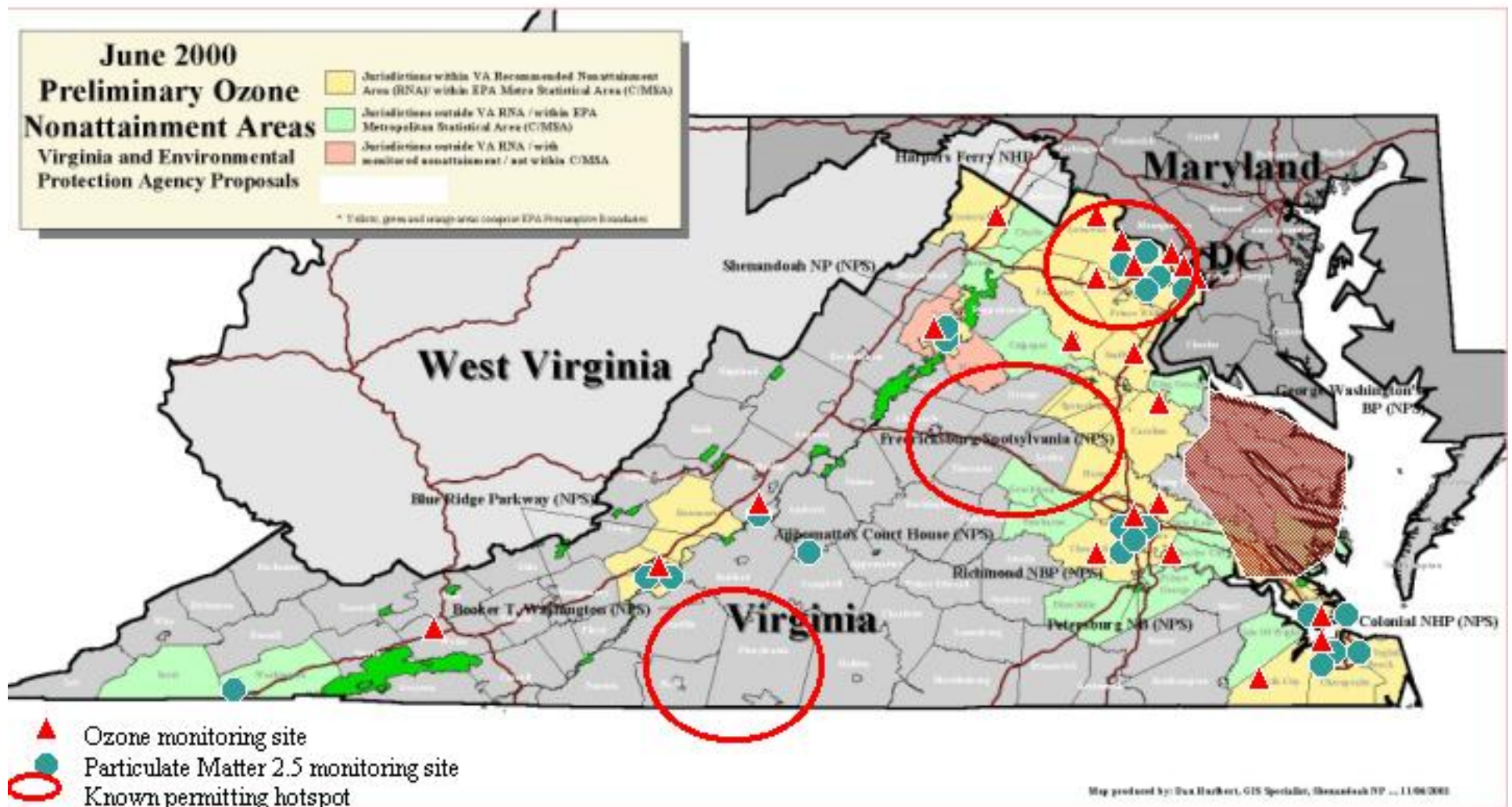
- Causes lung inflammation, shortness of breath, chest pain, wheezing, coughing
- Exacerbates respiratory ailments such as asthma
- Long-term, repeated exposures may cause chronically reduced lung function

## Particulate Matter Health Effects

- Impairs lung function
- Aggravates serious respiratory & heart disease
- Causes premature death

- Ozone also causes foliar injury, reductions in growth and vigor of native vegetation and reductions in agricultural and forest productivity at much lower critical thresholds
- Particulate Matter also impairs visibility





- Current number of Ozone and PM<sub>2.5</sub> monitors is insufficient to determine Virginia's air quality- especially in the Piedmont and South central VA permitting hotspots
- Large gaps in the monitoring network